

***HETERARTHURUS OCHROPODA* (KLUG) (HYMENOPTERA:
TENTHREDINIDAE), A NEW RECORD AND NEW PEST OF *POPULUS* SPP.
(SALICACEAE) IN TURKEY**

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Abstract.—A leafminer, *Heterarthrus ochropoda* (Klug 1818), is a new record for the Turkish fauna and a new pest of *Populus tremula* L. and *P. nigra* L. in Turkey. Its developmental stages, biology, damage, and infestation levels were studied in Erzurum during 2001 and 2002. There is one generation a year, and overwintering is in a pupal case in the leaf. Adults appear during mid-June to the first of July, and females oviposit into leaf tissue near the leaf apex. The early instar mines from the apex to the center of the leaf. Each leaf has one larva. The last instar forms a case in the mine at the end of the season and remains in the leaf until pupation the next year. Infestation levels may be as high as 70%.

Key Words: *Heterarthrus ochropoda*, Tenthredinidae, Hymenoptera, poplar pest, *Populus*

Poplar species (*Populus* spp.; Salicaceae) are very important in Turkey because of their use in industry as firewood and timber. Seven billion cubic meters of timber are obtained from all kinds of forest trees, and approximately half of this production comes from poplar (anonymous 1994).

Most sawflies associated with poplar in Turkey feed externally on the foliage. Some recorded, all Tenthredinidae, are *Stauronematus compressicornis* (F.), *Pristiphora conjugata* (Dahlbom), and *Trichiocampus viminalis* (L.) (Sekendiz 1974, anonymous 1994, Çanakçıoğlu 1993, Çanakçıoğlu and Mol 1998). One leafminer, *Messa hortulana* (Klug) also has been recorded as a pest of poplar (Güçlü and Özbek 1999). However, the leafminer *Heterarthrus ochropoda* (Klug 1818), has not been recorded from Turkey. It is known as a poplar pest in Europe, Crimea, northern Caucasus, Tien Shan, Latvia, Russia, and central Asia

where it has been recorded from *Populus alba* L., *P. nigra* L., and *P. tremula* L. (Benson 1952, Zhelochovtsev 1988, Liston 1995, Taeger and Blank 1998, Lacourt 1999). *Heterarthrus ochropoda* was discovered in Erzurum, Turkey, in 2001 and has been found on both *Populus tremula* L. and *P. nigra* L. This study was conducted to determine the nature of this new pest and its biology.

All species of *Heterarthrus*, a Holarctic genus of about 12 species, are leaf miners, and hosts other than *Populus* include *Betula*, *Acer*, *Alnus*, and *Salix*. The most complete biological studies are by Pieronek (1963) on several species in Poland, Altenhofer (1980a, b, c) on species in Europe, and the species on *Acer* by Altenhofer et al. (1987). Few studies have been done on *H. ochropoda* on *Populus*, the most comprehensive being included in the leaf-miner studies by Altenhofer (1980a, b, c).

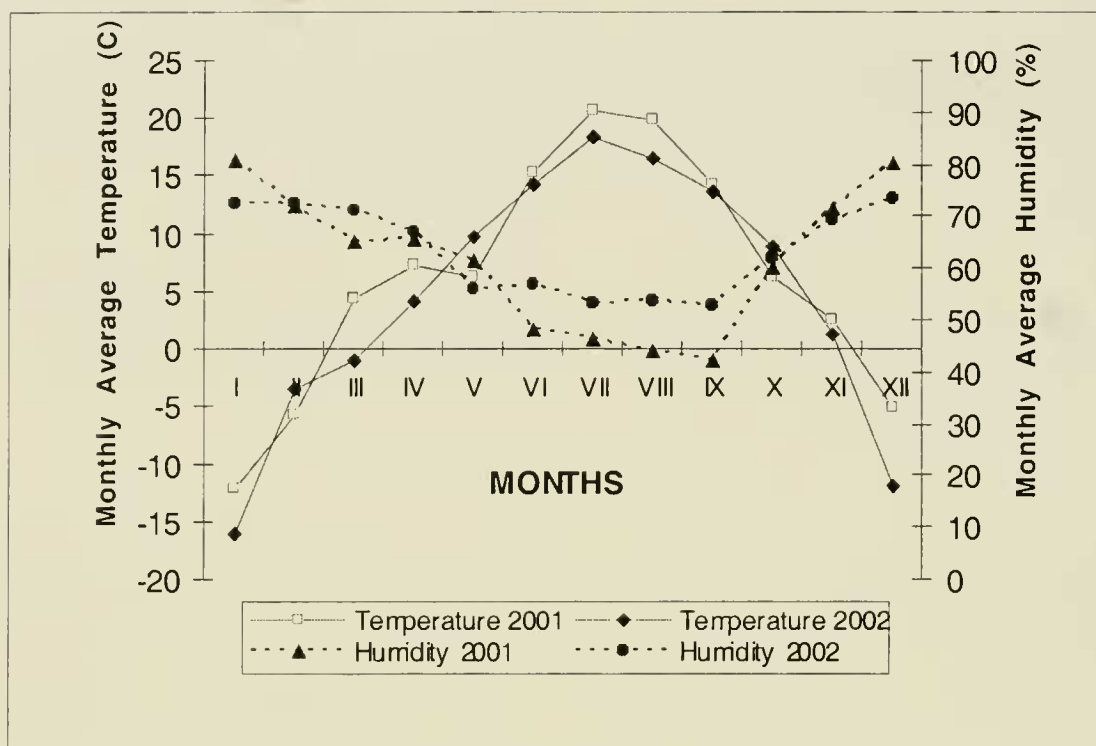


Fig. 1. Monthly average temperature and humidity at Erzurum, Turkey, in 2001 and 2002.

MATERIALS AND METHODS

This study was conducted on the campus of Atatürk University in Erzurum, located in the eastern Anatolia Region of Turkey (39°54'N, 41°14'E) at an altitude of 1850 m. More than 2000 acres of wooded area are on the campus. Although the trees are predominately pines, large areas of poplar trees also occur sporadically. The climate in Erzurum Province is rather extreme, with a cold and snowy winter, rainy spring, and dry summer, with an annual average temperature of 6°C and relative humidity of 60%.

In the study area, damaged leaves were collected four or five times a month from June to November in 2001 and 2002. More than 100 poplar trees were randomly examined in August to determine the infestation level. Branches of trees with infested leaves were brought to the laboratory and to obtain adults. Infested leaves were put in vials with water and kept in dessicators to rear the larvae. After the larvae made cocoons, they were put in a refrigerator and kept for about 5 months, then they were transferred to laboratory conditions.

To obtain adults in field conditions, some

of the branches with infested leaves were caged in August and kept until the following year.

RESULTS

Description.—Adult (Fig. 3D): Length, 5.0–5.5 mm. Female bright black; wings uniformly lightly infuscated, costa and veins black; legs yellowish; male with white spots laterally and ventrally on abdomen. Antenna 14-segmented. Head from above transverse, much broader than long.

Egg: White, water-drop shaped.

Larva: Late instar 9.6–10.8 mm long. Dorsoventrally flattened; thoracic legs small, prolegs absent. Whitish with head brown and eyespot, mandible, and narrow ring surrounding anal proleg dark brown; most of pronotum, prosternum, and small central spots on meso- and metasterna pale amber.

Pupa: Length 3.6–4.0 mm. Free type; whitish, later turning brown.

Biology (Fig. 2).—Observations are similar to those observed in Europe for *H. ochropoda* by Altenhofer (1980a, b, c). Hibernation is in the prepupal stage in the leaf between the two epidermal layers within

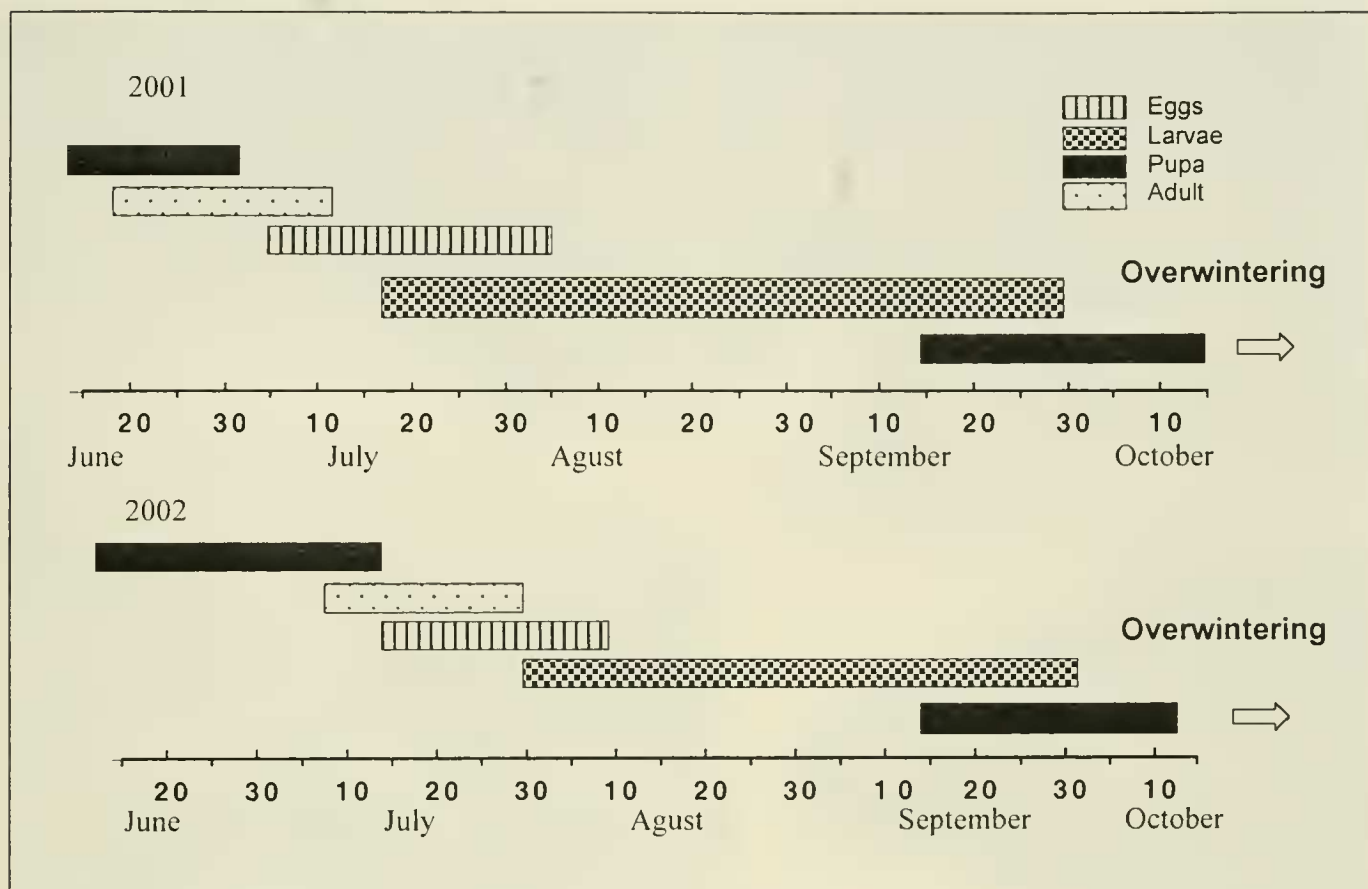


Fig. 2. Duration of biological stages of *Heterarthrus ochropoda* in Erzurum in 2001 (top) and 2002 (bottom).

fallen leaves on the ground. Adults were first observed on May 10, 2001, and May 18, 2002, in the laboratory, and on June 16, 2001, and July 2, 2002, in the field. The differences in emergence time of adults in 2001 and 2002 in the field probably were the result of higher temperatures in 2001 than in 2002 (Fig. 1). The duration of adult flying was approximately 15–20 days. Females oviposit into leaf tissue near the apex of the leaf, depositing one egg per leaf. The first larval instar and damage was seen on July 17, 2001, and July 30, 2002. These differences also might be related to higher temperature in 2001 than in 2002 (Fig. 1). Each leaf contained only one larva. The larva feeds in the gallery and enlarges the gallery by feeding toward the middle of the leaf (Fig. 3A). The larval feeding period continued until the first part of September when they made a disc-shaped pupal case in the leaf tissue. They hibernate as prepupae in the leaf, dropping to the ground with the leaves when the leaves fall in the autumn. Consequently, *H. ochropoda* had

only one generation a year under the ecological conditions at Erzurum during the two years observed.

Damage consists of a large blotchlike part of the leaf which the larvae eats out, thus browning the leaves. About the apical half of the infested leaves get dry and turn brown. The infestation levels in the study area were determined as 70% in 2001 and 50% in 2002.

In the laboratory, one pupal parasitoid, *Olesicampe* sp. (Ichneumonidae), was reared from *H. ochropoda*.

Messa hortulana (Klug) is another leaf-mining sawfly damaging poplar trees in the same locality (Güçlü and Özbek 1999). However, the damage of the larva of *H. ochropoda* differs from that of *M. hortulana*. *Heterarthrus ochropoda* larvae begin feeding at the tip of the leaf between the epidermal tissues and mine toward the middle. The damaged leaves are somewhat hard, tough, and brown in color, and the larva in the leaf is invisible. The larvae of *M. hortulana* feed by making galleries

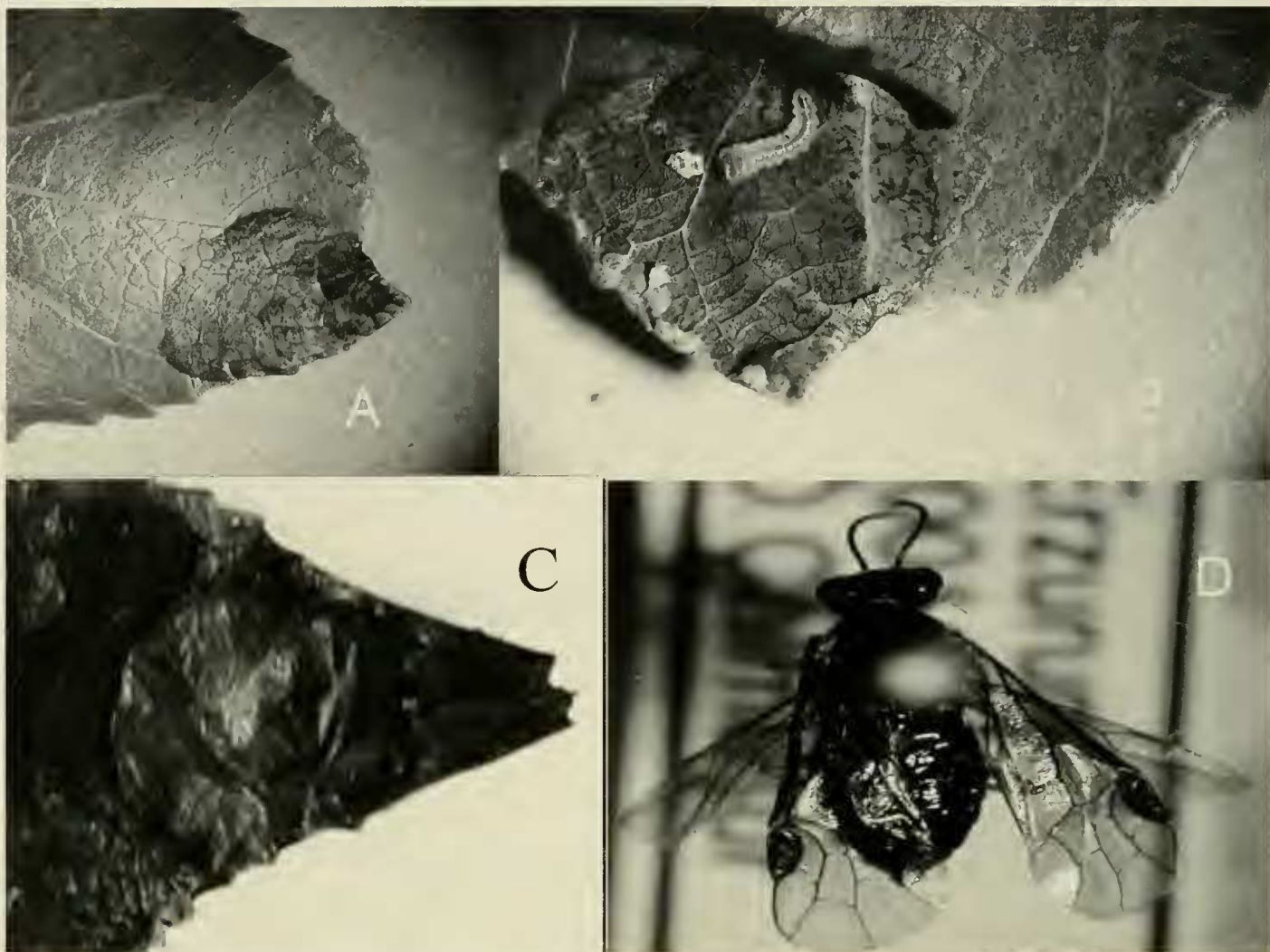


Fig. 3. Damage and biological stages of *Heterarthrus ochropoda*. A, Damage. B, Larva and damage. C, Pupal disc. D, Adult.

within the two epidermal layers near the borders or lateral edges of the leaves, the damaged leaves are almost transparent, and the larvae in the leaves are visible. The infested leaves of *H. ochropoda* have only one larva per leaf and those of *M. hortulana* generally have more than one larva. Güçlü and Özbek (1999) observed up to seven larvae of *M. hortulana* in one leaf. Overwintering is within the leaf in *H. ochropoda*, whereas the larva of *M. hortulana* leaves the leaf to overwinter in the soil. Since 2001, there has been an epidemic of *P. hortulana* on *Populus alba* in the narrow valleys along the branches of the Çoruh River (Yusufeli, Ispir, Uzundere, Tortum, Olur, Oltu, and Narman districts). We observed up to 13 larvae per leaf in these locations. Another important difference between the two species is that the activity of *H. och-*

ropoda starts in the middle of the summer and continues until the fall (end of September), and *M. hortulana* begins emerging in the spring and continues until the beginning of the summer.

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